

Material Separation Plan for the Diversion of Mercury

(MSP2)

July 1, 2002 – June 30, 2004

**Wheelabrator North Andover Inc.
North Andover, MA.**

March 2002

Material Separation Plan for the Diversion of Mercury (MSP2)

Wheelabrator North Andover Inc. North Andover, MA.

1) Introduction

In 1998, the Massachusetts Department of Environmental Protection promulgated regulations governing the emissions from Municipal Waste Combustors (MWCs) [310 CMR 7.08 (2)]. Section 7.08(2)(f)(7)(a) requires that owners or operators of MWCs prepare and submit a materials separation plan (MSP) for the diversion of mercury-bearing products from municipal solid waste. The MSP is to be submitted to the Department within six months of the issuance by the DEP of a MSP Guidance Document. The Department issued an MSP guidance document on January 5, 2000 and a modified guidance document on February 16, 2000.

On September 21, 2001, DEP issued a letter to Wheelabrator North Andover Inc. (formerly Massachusetts REFUSETECH Inc.) extending the dates related to submittal of the MSP for 2002 (MSP2), the completion of MSP1, implementation of MSP2 and completion of MSP2. On February 8, 2002, DEP issued another letter confirming the new dates. Consequently, this Materials Separation Plan (MSP2) is for the period July 1, 2002 through June 30, 2004.

2) Facility Description

The Wheelabrator North Andover waste-to-energy facility consists of two, identical mass-burn, municipal waste combustion (MWC) units, each with a capacity to combust 750 tons of municipal solid waste per day. The facility is located on Holt Road in North Andover, MA. In 2000, the facility completed an upgrade of its air quality control systems that also included systems to control mercury emissions.

3) Goal of the Plan

The overall goal of this Material Separation Plan (MSP) for the Wheelabrator North Andover municipal waste combustion facility is to attempt to divert mercury-containing products from the municipal solid waste stream that potentially could be delivered to the Wheelabrator North Andover facility. To accomplish this goal, Wheelabrator North Andover will attempt to educate the general public and businesses regarding the need to divert mercury-containing products from the municipal solid waste (MSW) stream and to provide a source of information concerning proper disposal. Wheelabrator North Andover also plans to provide resources for those that wish to properly dispose of and recycle their mercury-containing products.

4) Plan Development Process

The development of this Plan Extension was accomplished through discussions with MA DEP staff, municipal officials in Contract Communities, and School officials in Contract Communities.

5) Target Sectors

The target sectors for this Plan are the general public, HVAC contractors and schools within the Wheelabrator North Andover service area.

6) Service Areas

The Wheelabrator North Andover facility serves 23 NESWC communities (see Table 1) under long-term contracts (Contract Communities). Additionally, five (5) non-NESWC communities and seven commercial accounts are served under short-term (e.g., five year) contracts. Non-contract or "spot market" customers that can vary from day-to-day and year-to-year use the remainder of the solid waste disposal capacity of the facility.

7) Description of Activities

a) Outreach/Education

i) Goal

The goal of the Outreach/Education portion of this MSP is to change the behavior of Massachusetts' citizens who dispose of mercury containing products in household trash by the use of effective outreach programs that educate and inform the public about mercury-containing products and teach proper product recycling and/or disposal methods.

ii) Regional

(1) General Discussion

Wheelabrator North Andover proposes to work in conjunction with the other MWCs subject to 310 CMR 7.08(2)(f) to develop and implement a regional outreach/education program.

The five MWCs subject to 7.08(2)(f) have service territories that range from the Atlantic coast to Worcester and from New Hampshire to Connecticut. All of these facilities also have a percentage of their waste coming from non-specific "markets". Therefore, a Regional outreach/education program, in addition to targeted local programs, will have the ability to reach the greatest numbers of people and businesses.

To coordinate and administer this Regional program, the five MWC's have retained the services of the Integrated Waste Services Association (IWSA).

The Regional program will not target specific municipalities in Massachusetts, but will focus on development and delivery of generic messages to educate consumers and others who handle mercury products. These messages may include: identification of mercury-containing products, efforts to raise awareness of health risks of improper disposal of mercury products (thermometers, fluorescent lighting, etc.) in the normal course of residential and commercial refuse collection, and providing consumers and others who handle mercury products with information concerning the proper method of recycling and/or disposal of such products.

The Regional program will use mass communication channels to reach the greatest number of Massachusetts' citizens, as well as smaller

subsets of high-end users of mercury products, with specific action steps they can take to help ensure that mercury containing products are properly recycled and/or disposed.

Although businesses may have the greatest volume of mercury-containing products to dispose of, every employer or business owner is also a consumer.

(2) Regional Outreach Programs

The following summarizes the activities to be completed by the IWSA. Each activity listed below will be implemented between July 1, 2002 through June 30, 2004. Specific timelines are provided for each activity, but times are estimates.

The Budget costs below are estimates of the Regional Outreach costs attributable to this facility.

As requested by DEP and consistent with previous outreach work, each activity provided herein describes the activity including its education value, the targeted population, an estimated timeline for implementation, estimated cost, and an explanation of where the activity will take place (i.e., the specific medium for the message.) Each activity described herein does not contain a discussion of the evaluation process, which instead is provided more generally because one evaluation tool (the research study) is used for all activities.

(a) Regional Outreach Program Administration

The Regional Outreach Program will be administered by IWSA. To develop and produce components of this Program, IWSA will retain the services of a professional public relations/advertising agency.

(i) Objectives

IWSA's Education Plan for 2001 produced a media campaign "Keep Mercury from Rising^(SM)", including newspaper and radio advertisements, posters, and a brochure for use by the facilities. The first six months of 2002 will take advantage of the prior year's work by continuing to use targeted advertising to reach communities serviced by waste-to-energy facilities. The objectives for MSP2 include the following:

- Continue to raise awareness about mercury-containing products in the home and the proper handling and disposal of these products;
- Provide information and promote local recycling events;
- Continue to build an integrated communications program that leverages opportunities for incremental, free media, and works synergistically with the efforts of individual waste-to-energy facilities.

(ii) Tactics

IWSA will continue targeted advertising to reach communities serviced by the facilities, as well as implement marketing of print advertisements and radio live-read script to run as public service announcements. The facility through IWSA also proposes to expand web capabilities to provide additional tools for residents in target communities to participate in recycling of mercury-containing products. IWSA also will reach out to the media to generate media coverage of the public education campaign.

(iii) Evaluation Tool

The effectiveness of all activities will be measured by a research survey. The 2003 and 2004 surveys will be completed in the first half of the year and compared with earlier polls to better define the audience and the effectiveness of the message and media. The polls will be designed to measure positive changes in public attitudes and behaviors, as well as the receptiveness of the message.

Timeline:

The surveys are expected to go into the field in May, shortly after completion of publication of print and airing of radio media.

Activity:

The survey questionnaire will time out at between six and eight minutes in length, and the study will consist of 400-500 completes, providing a $\pm 4.39\%$ error rate at a 95% confidence level. The survey will be executed via random digit dialing from electronically generated phone lists. A series of screen questions would produce the necessary targeted universe of respondents.

Budget Estimate:

\$ 7,500

(b) Details of Activities

(i) Advertising

Radio and print advertising will be used. Radio is a targeted medium that provides cost-efficient mass communication and quickly builds frequency of message delivery. Radio added-value programs can provide an opportunity to interact with local communities. Print advertising can be equally effective. Residents look to community newspapers for information on local activities and events. Additionally, these publications are a cost-efficient way to reach the target. Due to allocation of costs between American Ref-Fuel, Covanta Energy and Wheelabrator Technologies, the advertising will be focused on the Boston market, Wooster area and North Andover / Haverhill region.

Timeline:

Three-week radio buy in late April or early May, 2003. Four-day radio buy in late April, or early May, 2004. Print advertising to support radio buys.

Activity:

Radio: IWSA proposes to implement a three-week radio buy in late April or early May. The buy would be scheduled to encourage mercury recycling activities and added-value opportunities (e.g., sponsorship of special broadcasts, contests, and free spots stations provide) will be considered in development and negotiation of the buy. Print: Advertising will include a limited print effort including regional sections of the Boston Globe and local publications that reach the target audience.

Budget Estimate: \$ 58,000

(ii) Public Service Advertisement (PSA) Marketing and Media Outreach

Strong interest in environmental issues among Massachusetts's residents makes the Campaign and the efforts of IWSA/WTE a potentially interesting story for journalists. The Mercury Campaign's advertising message and presentation in both print and radio provides a strong opportunity to gain free exposure of the ads on radio stations and in newspapers. This is evidenced by the unsolicited request that was received from a radio station in the Boston area for a live-read version of the radio spot for use as a PSA. IWSA and its' consultant, Porter Novelli, will market the PSA to gain free media.

Activity:

Conduct outreach among Northeastern Massachusetts's media to generate coverage of the Mercury Recycling Campaign and the positive work of WTE providers. Identify local print and radio media and promote the use of the Mercury Campaign advertisements as PSAs.

Timeline: Ongoing

Budget Estimate: \$6,000

(iii) Web-based Tools

This internet-based community information resource could be readily built, easily updated and is extremely cost-efficient.

Activity:

Build upon MSP1 Extension web site for dissemination of information on local recycling events. Potentially, this might include development of a searchable database where residents could easily locate information on their locality.

Timeline: October 2002 and October 2003

Budget Estimate: \$6,500

(iv) Video

There was strong interest from the communities in discussions on the development of MSP1, to have a video that could be shown on Public Access cable stations. Based upon input from DEP, production of a video was dropped from MSP1. Based upon recent discussions with EOE, the production of such a video is now seen to have merit. The video will explain the need to recycle mercury-containing products and the efforts undertaken by the state of Massachusetts and waste-to-energy facilities. The video will also be suitable for use by high school science classes.

Activity:

Production and distribution to Contract Communities of a short five-to-seven minute video illustrating the need to keep mercury containing products out of the waste stream that can be used on Public Access cable TV stations, high school science classes, public meetings, etc..

Timeline:

October 2002

Budget Estimate:

\$ 5,000

(v) Print Materials

A brochure and poster layout has been developed and is being used by IWSA companies and public officials responsible for disseminating information about mercury recycling. IWSA does not propose to alter the materials, but will make such materials available as needed.

Timeline: Ongoing

Activity: Support facilities as needed with additional print materials.

Budget Estimate:

\$ 1,000

iii) Local Outreach

(1) Goal

The goal of the Local Outreach Program is to inform the public within the respective MWC facility's service area regarding mercury-containing products, the problem with improperly disposing of them, and MSP programs for the diversion of the products within their communities.

Local outreach activities will primarily include informational advertisements in local media, e.g., newspapers, regarding local mercury recycling programs such as thermometer exchange programs, mercury drop-off locations and times, etc., and production and distribution of other materials as needed for informing the public about mercury and the various MSP Programs.

The MSP Administrator has arranged with a news service to place ads in local newspapers. Therefore, a single ad placement will reach most, if not, all local newspapers in the Wheelabrator North Andover Contract Communities.

(2) Timeline

(a) Various outreach activities stemming from the production of materials from the Regional Outreach Program.

- to be coordinated with production of materials from the Regional Outreach Program

(b) Posters advertising the Thermometer Exchange Program

- Periodically throughout year

(c) Local newspaper ads regarding Thermometer Exchange Program

- Periodically throughout year, e.g., July through June

(3) Budget Estimate:

Production and placement of ads in local newspapers for the Thermometer Exchange Program

(12 sets of ads x \$6000/ad) \$ 72,000

Production and reproduction of posters for the Thermometer Exchange Program

(23 communities) \$ 1500

b) Mercury Separation and Recycling Programs

According to US EPA estimates, some of the largest contributors to mercury in trash are fluorescent lamps, thermostats, electrical switches and thermometers. However, the primary sources of these products are distinctly different. According to the National Electrical Manufacturers' Association (NEMA), over 80 percent of all fluorescent lamps are in non-residential buildings. For this MSP, it was decided to focus on education of consumers and providing resources for the recovery of mercury-containing products. This will be accomplished through direct outreach programs as described above, and through specific mercury-containing product recovery projects. Recovery and recycling of fluorescent lamps will not be a focus of this MSP. Fluorescent lamps in municipal buildings and those collected from homeowners in a number of communities are, however, already covered by the State contract with Superior Special Services Inc. (formerly Global Recycling), a mercury recycling facility. The outreach program described above should increase consumer awareness of the need to recycle fluorescent lamps and increase the utilization of these existing municipal efforts.

MSP1 has had success with the mercury thermometer exchange program, and limited success with the thermostat drop-off program.

NEMA estimates that contractors install 90-95 percent of all thermostats. Assuming that this same percent applies to the thermostats that are replaced during remodeling projects and demolition projects, the target sector for thermostats should be contractors and do-it-yourselfers.

US EPA estimates that, nationwide, household thermometers account for 17 tons per year of mercury disposed of as solid waste or into wastewater treatment plants. Medical facilities are becoming more aware of the mercury issue and

many have already switched from mercury thermometers to non-mercury ones. Many hospitals also now prohibit the practice of giving a mercury thermometer to the parents of newborns. Therefore, a program aimed at removing mercury thermometers from households and replacing them with non-mercury thermometers should have a significant impact on the disposal of mercury, either in the trash or into wastewater systems.

i) Thermostat Recycling Program

(1) Background

Thermostat manufacturers have developed a program for the recovery and recycling of thermostat switches that contain mercury. The Thermostat Recycling Corporation (TRC) was formed in 1996 as a non-profit corporation to administer a national program to recycle mercury-containing thermostats.

The TRC program operates as a reverse distribution system beginning at the point of purchase. For a wholesaler to participate in the program, they must purchase a recycling container from TRC for \$15.00. When the container is full of thermostats, the lid is secured and the container is used as a mailer that is shipped via RPS to Honeywell in Minnesota.

During the initial implementation of MSP1, TRC was approached about participating through the municipalities. As stated above, TRC's program is focused on contractors and wholesalers, and TRC's approval would be required to give the containers to the communities rather than the wholesalers. TRC declined to use the community-based approach

(2) Community Involvement

In meetings with communities in the development of MSP1, some municipal representatives suggested that the local building departments and building inspectors could play a role in this activity.

MSP1 provided the Contract Communities with resources for recovery of mercury-containing thermostats at a convenient location (a municipal office or building) for contractors that remove these thermostats from existing structures to bring these devices.

This portion of MSP1 has met with only limited success. However, the MSP Administrator has been working with a number of municipalities to develop local ordinances requiring contractors to properly dispose of mercury-containing thermostats. The Administrator is also working with DEP to obtain a letter to municipalities from DEP that can be used by the municipalities to help develop their ordinances. This activity will continue into 2002.

(3) Goal

The goal of the MSP Thermostat Recovery Program is to provide resources for recovery of mercury-containing thermostats and a convenient location for contractors that remove these thermostats from existing structures to bring these devices.

Wheelabrator North Andover is proposing to work with the facilities' Contract Communities to develop ordinances and to offer to supply thermostat collection containers to each community.

Wheelabrator North Andover will continue to provide suitable containers to the Communities and then arrange with a mercury recycling contractor to accept the used thermostats for recycling.

(4) Timeline

(a) Continue to obtain and distribute Used-Thermostat Containers
July 1, 2002 – June 30, 2004

(b) Working with Municipalities to develop of Local Ordinances
July 1, 2002 – June 30, 2004

(5) Budget Estimate (to be refined with actual costs later)

Collection containers for used thermostat (23 communities)	\$ 1000
Recovery of thermostats	\$ 2000

ii) Thermometer Exchange Programs

(1) Background

A mercury program that has been very successful across the country is the thermometer exchange or swap program. Nationwide, hospitals and other entities have conducted these swaps and found them to be effective, not only in removing a potential mercury waste material from homes, but also as an important tool to educate the general public on mercury issues. The thermometer exchange program is very simple: people are invited to bring their home glass mercury thermometers to a central location and exchange them for a new, digital, non-mercury thermometer.

The MSP1 thermometer exchange program has been a success in most of the communities. The success is linked to the regional and local advertising. Therefore, the majority of the local outreach will be aimed at increasing the public's awareness of the existence of the exchange programs.

(2) Goal

The goal of the Thermometer Exchange Program is to educate the general public on the issue of mercury in solid waste and to provide an incentive for individuals and families to properly remove a significant mercury source, i.e., fever thermometers, in their homes.

(3) Thermometer Exchange Program

In MSP1, digital thermometers were distributed to Contract Communities based upon their relative populations. Some communities had more successful programs than anticipated and needed additional thermometers. For MSP2, Wheelabrator North Andover proposes to continue to offer thermometer exchange programs to each of the Contract communities. Where the municipal government wishes to participate, the digital thermometers and mercury thermometer collection containers will

be provided to the municipality. Wheelabrator North Andover will arrange for periodic pickup and recycling of the mercury thermometers.

Wheelabrator North Andover will replenish the communities' supplies of digital thermometers as they are consumed. The number of additional digital thermometers needed for MSP2 is estimated based upon the number of digital thermometers assumed to be currently on hand in each community.

Whereas in MSP1, the digital thermometers were allotted to communities on the basis of number of households, the MSP2 digital thermometers would be pooled and distributed to communities as needed.

(4) Outreach

Advance publicity regarding the thermometer exchange programs will be conducted through the Local Outreach portion of the MSP and will be managed by the MSP Administrator and the respective MWC facility. The advance publicity will consist primarily of advertisements placed in local newspapers. Where it may be productive, posters, flyers or brochures may also be produced and distributed. Wheelabrator North Andover will also work with the Contract Communities to attempt to get stories about the Exchange program placed in local newspapers.

(5) Timeline

- (a) Continue to offer Thermometer Exchange Program to Communities
June 2002 – July 2004
- (b) Placement of newspaper ads
Periodically June 2002 – July 2004

(6) Budget Estimate

Digital thermometers	\$60,000
Recycling costs	\$ 8,000
Outreach (see Local Outreach Program)	

iii) School Clean Sweeps

Schools, especially high schools, often possess mercury in a variety of forms for educational purposes. School science laboratories can have quantities of elemental mercury used for experiments and demonstrations. Also most scientific thermometers and barometers contain significant quantities of mercury, and the science storage rooms house often out-dated and long-unused mercury-containing reagents.

During MSP1, all school systems in the Contract Communities were offered the Clean Sweep. Several declined to participate, primarily because the mercury-containing items that would be surrendered under the Clean Sweep, would not be replaced by the school department since it was not previously budgeted.

In order to alleviate this concern, Wheelabrator North Andover, during the extension to MSP1, is conducting a survey of the schools that did not participate and determine (1) if they would participate if the removed mercury-

containing items were replaced with non-mercury-containing items and (2) what are these items and how many of each item does each school require. If the results of this survey warrant, it is anticipated that under MSP2, Wheelabrator North Andover will acquire the necessary non-mercury items and offer them to those schools to facilitate participation in the Clean Sweep.

(1) Goals

The goal of the School Clean Sweep Program will be to identify unnecessary mercury and mercury-containing products in public schools in Contract Communities, offer to replace the products with non-mercury substitute products, and remove unnecessary mercury and mercury-containing products from schools that accept the offer.

(2) Timeline

Purchase replacement products and conduct "Clean Sweeps"

June 2002 – July 2004

(3) Budget

To be determined based upon replacement costs and participation of Schools – estimate \$15,000

iv) New Programs

Based upon input from officials in Contract Communities, Wheelabrator North Andover added two new programs during the MSP1 Extension period. The two programs were a Mercury-containing button battery collection program and a Miscellaneous Mercury Items Collection Program. Wheelabrator North Andover proposes to continue those programs into MSP2.

(1) Mercury-containing button battery collection program.

Wheelabrator North Andover proposes to continue the Mercury-containing button battery collection program in each of the Contract Communities participating in the MSP programs. The button battery program will be conducted using the same community resources as the thermometer exchange program. Wheelabrator North Andover will continue to provide the Mercury-containing button battery collection boxes and periodically have full boxes collected to recover the mercury. Boxes that contain non-mercury-containing batteries will not be collected and will be the responsibility of the Community.

Timeline:

Distribute boxes and collect batteries June 2002 – July 2004

Budget Estimate:

Collection Boxes	\$ 2,000
Collection of boxes and Recovery of mercury	\$4,000

(2) Miscellaneous Mercury Items Collection

During the course of the thermometer exchange program, a number of communities requested that they be allowed, on an ad hoc basis, to collect other mercury-containing products and incorporate those items

into the thermometer or thermostat collection containers to be collected by Wheelabrator North Andover mercury recycling contractor.

These requests came about due to residents contacting their community Board of Health or DPW since they had become aware of the thermometer program, and the residents asking to bring in other mercury items, e.g., a small bottle of mercury.

Wheelabrator North Andover proposes to accept miscellaneous mercury-containing items, including an occasional small amount of elemental mercury, from residents, but not businesses, on an ad hoc basis. Wheelabrator North Andover does not intend to advertise or make this widely known.

Timeline: June 2002 – July 2004

Budget: \$10,000

8) Program Administration

The Mercury Material Separation Program will be managed by the Wheelabrator North Andover facility. Wheelabrator North Andover has retained Mr. Patrick Scanlon of Scanlon Associates to conduct the general administration of the Plan. Mr. Scanlon will be responsible for ensuring the elements of the Plan are accomplished and for administering the budget. Mr. Scanlon will also coordinate with MA DEP to minimize duplication of efforts between this MSP and DEP's on-going efforts.

The administration of the Regional Outreach and Education Program will be conducted by the Integrated Waste Services Association (IWSA). IWSA has been retained to manage and provide direction to the professional outreach firm that will be developing the Regional Outreach and Education elements.

Depending upon the extent to which communities decline to participate in the above programs thereby necessitating more MSP administrative activities than proposed in the above Plan, additional administrative support may be necessary. If additional support is required, the budget will be adjusted to accommodate the additional support.

While specific individuals are cited in this Section, Wheelabrator North Andover reserves the right to make necessary changes to administrative personnel.

9) Measurement and Evaluation

Compliance with the Material Separation provisions requirements of 310 CMR 7.08 will be based upon the implementation of this Plan, e.g., implementation of a regional and local outreach program, offering a thermometer exchange program, etc

This MSP does not estimate the amount of mercury expected to be diverted or the participation rate (i.e., number of people who will be moved to action. It is possible that in coming years, experience will teach whether one activity or another is more effective. Experience and time might help prioritize activities that have the greatest likelihood of success. However, an accurate accounting of the amount of mercury

diverted from trash, even in hindsight, is difficult, if not impossible. A person persuaded by this MSP's Outreach Programs to properly recycle mercury may take the product to a resource provided by a waste-to-energy facility, or may use one of a number of other means that are not evaluated by the facility's MSP. A significant amount of the mercury diverted by the Outreach efforts may be disposed or recycled in non-MSP location or as part of other collection programs. Indeed, if the education efforts provided by this MSP are successful, consumers may purchase non-mercury-containing products to substitute for mercury-containing items.

While individual activities may not be accurately measured in terms of accounting for the amount of mercury products recycled at a given recycling or disposal station, the overall efforts of this MSP and the DEP will be evaluated indirectly through the surveys described in the Regional Outreach Program. Over the years, trends will develop in purchasing and disposal methods preferred by the public. Market surveys may be developed to establish how purchasing and disposal decisions have changed for the better.

The MSP Administrator will, to the best of his ability, record the amount of mercury that is collected from MSP programs. An annual report will be prepared and submitted to DEP by February 15, 2003 and 2004.

Table 1. Contract Communities - Wheelabrator North Andover Inc.

Community	Population
Acton	18,851
Andover	30,891
Arlington	43,656
Bedford	13,676
Belmont	24,044
Boxborough	3,979
Burlington	23,493
Carlisle	4,599
Dracut	27,769
Hamilton	7,487
Lexington	29,484
Lincoln	5,085
Manchester	5,367
No. Andover	24,283
No. Reading	12,919
Peabody	48,365
Tewksbury	28,644
Watertown	32,490
Wenham	4,423
Westford	18,642
West Newbury	3,871
Wilmington	19,874
Winchester	20,318
TOTAL	454,222

July 1996 Population Estimates of the Population Division of the U.S. Bureau Of the Census by the Massachusetts Institute for Social and Economic Research, Nov. 1997

Wheelabrator North Andover
MSP2
Two Year Budget Estimate

MSP2 Estimated Budget including Plan Development – 2 years

No. of Contract Communities Served	23
2001 tons MSW processed	458,346

Administrative Costs	
Scanlon Associates	
Fees & Expenses	90,000
Plant (estimate)	
Plan Development – estimate	
WTI	5,000

Programs	
Regional Outreach/Education	84,000
Local Outreach/Education	73,500
Thermometer Exchange	
Thermometer costs	60,000
Recycling costs	8,000
Thermostat Program	3,000
School Programs	15,000

Additional Programs	
Button Battery Collection	6,000
Misc. Mercury Item Collection	10,000
Contingency @ 5%	18,000
Total Costs	372,500